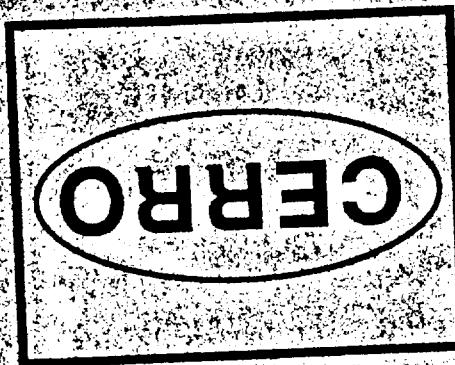


SVERDRUP

December 1987

Prepared for
Cerro Copper Products Company
Saugeret, Illinois
PCR MONITORING
FIELD SAMPLING REPORT



153541

FIELD SAMPLING REPORT
PERIODIC COMPLIANCE REPORT MONITORING

CERRO COPPER PRODUCTS COMPANY
SAUGET PLANT
SAUGET, ILLINOIS

Prepared By

SVERDRUP CORPORATION
ST. LOUIS, MISSOURI

December 1987

FOREWORD

Sverdrup Corporation was retained by Cerro Copper Products Company in December 1987, to conduct Periodic Compliance Report (PCR) monitoring involving five wastewater discharges associated with the Saugeet Plant. The field activities related to the work involved:

1. Preparation of Sampling Locations/Flow Monitoring Equipment
2. Collection of Wastewater Samples
3. Collection of Flow Rate Data

Activity 1 took place on Monday, August 7, 1987 and Activities 2 and 3 were performed over a 24-hour period beginning the morning of December 9, 1987.

This report presents the field and analytical results related to the PCR monitoring for all five locations. Its purpose is to present the data obtained for reasons of documentation and future use by Cerro in preparing a formal Periodic Compliance Report.

TABLE OF CONTENTS

SECTION

- I. DESCRIPTION OF SAMPLING LOCATIONS
- II. SAMPLE COLLECTION/FLOW MONITORING PROCEDURES
- III. SUMMARY OF FLOW MONITORING DATA
- IV. INDEX OF ANALYTICAL DATA
- V. ANALYTICAL RESULTS

I DESCRIPTION OF SAMPLING LOCATIONS

This section provides a brief description of each of the six sampling locations, including the significance of the discharge, the flow monitoring method, and specific sample collection points.

LOCATION 3-B

Sampling Location 3-B is at the lift station just north of Tube Mill No. 2 (see Figure I-1). The sampling point was the discharge from a 12-inch diameter cast iron pipe entering the wet well from the east. The flow in the pipe represents the wastewater discharge from the Copper Forming operations at Tube Mill No. 2, with the exception of some sanitary wastewater entering the wet well via a 6-inch diameter cast iron pipe adjacent and above the sampling point.

The wet well is approximately 15 feet deep with the sampling point approximately 4 feet off the bottom. Flow rate was monitored by measuring the depth of flow in the 12-inch diameter pipe. Samples were collected from the flow exiting the pipe.

LOCATION 8-A

Sampling Location 8-A is at the inlet manhole located along the main plant road just west of the Control Center (see Figure I-1). The flow entering the manhole from the east represents the process flow from the wet-processing areas of the Secondary Copper operations located in the central part of the plant complex. Other flow discharging to the manhole includes stormwater flow from several inlets in the sewer system upstream of the manhole and flow associated with the plant laboratory discharging west from the Control Center.

The manhole is approximately 6 feet deep with a 4-inch and two 12-inch diameter clay entrance lines and a 12-inch diameter clay exit line. Flow rate was measured with an 8.5-inch wide rectangular weir insert installed in the 12-inch clay pipe exiting to the east. Samples were collected from the flow entering the weir.

LOCATION 9-A

Sampling Location 9-A is at the lift station just north of

Shaft Furnace Building No. 19 (see Figure I-1). The sampling point was the discharge from a 12-inch diameter cast iron pipe entering the wet well from the west. The flow in the pipe represents the wastewater discharge from the Direct Chill Casting operations at Building No. 19.

The wet well is approximately 12 feet deep with the sampling point approximately 4 feet off the bottom. Flow rate was measured with an 8.0-inch wide rectangular weir bolted to the wall in front of the 12-inch pipe. Samples were collected from the flow exiting the weir.

LOCATION 12-C

Sampling Location 12-C is the discharge from the East Outfall Lift Station located at the extreme northeast sector of the plant (see Figure I-1). The flow discharging the lift station represents the majority of the process wastewater, sanitary wastewater, and stormwater leaving the plant site that is associated with the Copper Forming and Secondary Copper operations at the plant. Monitoring at this location allows full quantification of the pollutant discharge rates leaving the plant complex via the East Outfall.

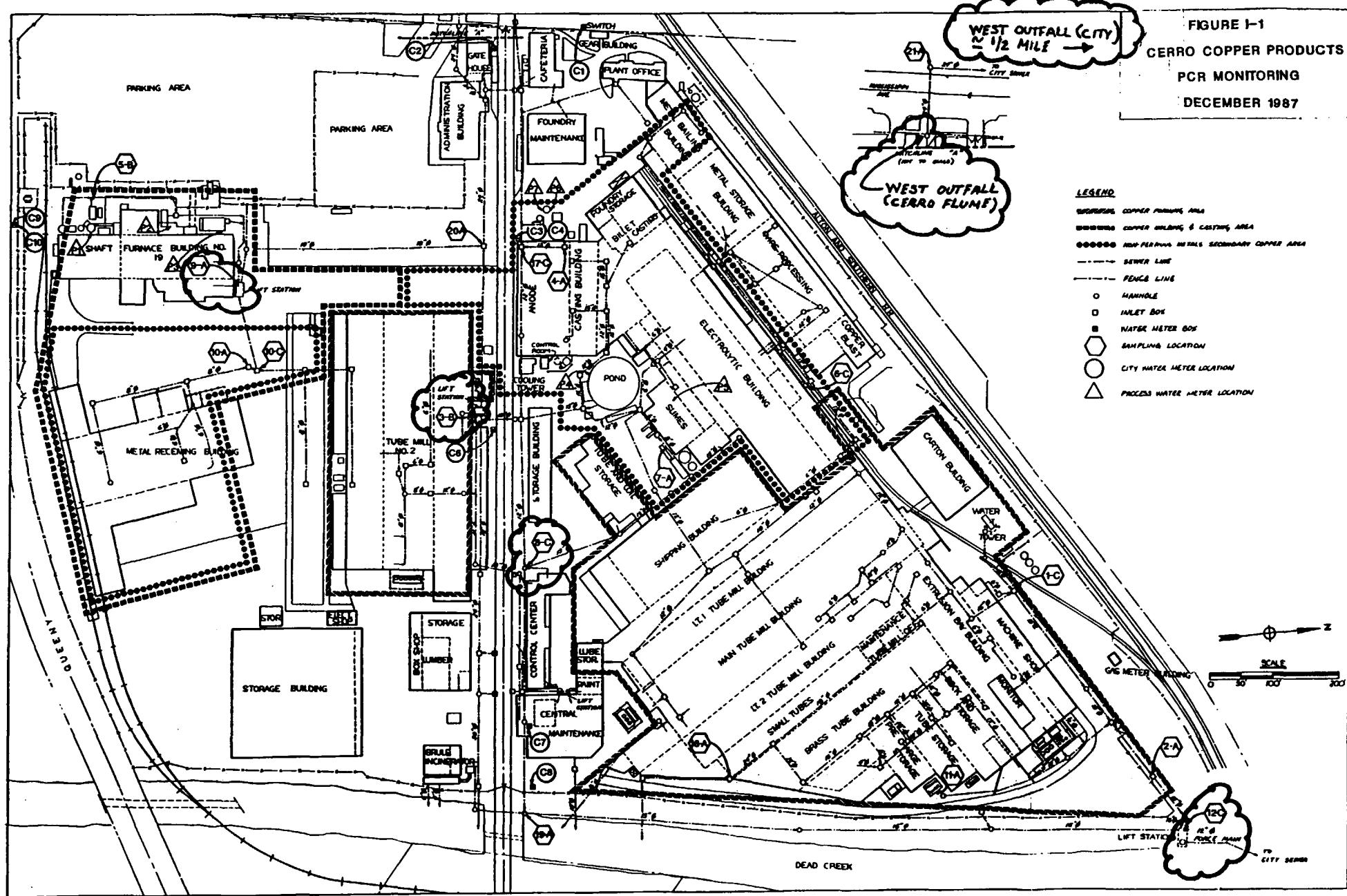
Samples were collected by engaging the automatic sampler installed at the lift station. Flow rate was monitored with an existing sonic type flow meter designed to monitor and record the discharge from the lift station.

CERRO WEST

Sampling Location Cerro West is at the inlet manhole at the west entrance to the plant located east of Mississippi Avenue (see Figure I-1). Monitoring at this location allows quantification of pollutant discharge rates in the discharge via the West Outfall. It includes all flow discharged from the lift stations at Building 19 and Tube Mill No. 2, stormwater from the main parking area, and sanitary flow contributed from the Administration Building, Cafeteria, and Gate House.

The manhole is approximately 12 feet deep and serves as access to an 18.0-inch Leopold Lagco permanent flume installed in an 18-inch diameter clay pipe. Samples were collected at the entrance to the flume.

FIGURE I-1
CERRO COPPER PRODUCTS
PCR MONITORING
DECEMBER 1987



II SAMPLE COLLECTION/FLOW MONITORING PROCEDURES

SAMPLE COLLECTION

All samples collected were manual grab samples collected directly from the source streams. Some of the individual grab samples were used to prepare 24-hour flow-proportional composite samples. The collection/preparation procedures are described below.

Grab Samples

Grab samples were collected on 4-hour intervals during the 24-hour sampling period. They were collected from the source streams using individual bottles specific to the type of analysis performed. See Table II-1 for a summary of the type of bottles and preservatives used.

The bottles were filled carefully so that the preservatives, which were added by the lab, were not displaced. All samples were placed on ice after collection.

Composite Samples

Flow-proportional composite samples for metals analysis were prepared by the analytical laboratory for each sampling location. A data sheet was compiled for each location that listed the percentage of sample required from each grab sample based on the flow rates measured during the six 4-hour sampling periods. Table II-2 provides a summary of the data compiled relative to the preparation of the composite samples.

FLOW MONITORING

Wastewater flow rate was monitored at each location in conjunction with the collection of samples. This was accomplished by physically measuring the head over individual primary flow devices. These measurements were converted to flow rate based on rating curves prepared for each sampling location. Table II-3 provides a summary of the flow measurement devices for each sampling location.

TABLE II-1
SAMPLE BOTTLES AND PRESERVATIVES

Analysis	Type	Bottle Size	Preservative
VOA(1)	Clear Glass	40 ml	Ice
NVBN + NVA(2)	Amber Glass	1000 ml	Ice
Metals(3)	White Plastic	500 ml	1 to 1 Nitric Acid
Water Chemistry(4)	White Plastic	500 ml	Ice
Phenolics	Amber Glass	8 oz	Sulfuric Acid
Oil & Grease	Amber Glass	1 quart	1 to 1 Sulfuric Acid

NOTES:

1. Volatile Organics Analysis - EPA Priority Pollutants
2. Nonvolatile Base Neutrals + Nonvolatile Acids - EPA Priority Pollutants
3. Analyzed for Total Chromium, Total Copper, Total Lead, Total Nickel, Total Zinc, Total Cadmium, Total Iron
4. Analyzed for pH, Acidity, and Total Suspended Solids (TSS)

TABLE II-2
SUMMARY OF DATA FOR COMPOSITE SAMPLES

Sampling Period	3-B	9-A	West Cerro	8-C	12-C
	<u>Bottle #/Flow Rate (GPM)/% of Sample</u>				
1	3/54/17	4/20/5	1/80/14	2/94/17	5/209/16
2	7/54/17	8/139/34	9/120/21	10/82/15	12/237/18
3	13/75/25	14/139/34	15/110/20	16/94/17	17/341/26
4	18/36/12	19/15/4	20/135/24	21/100/18	22/204/16
5	23/54/17	24/20/5	25/80/14	26/96/17	27/185/14
6	28/36/12	29/71/18	30/38/7	31/84/16	32/124/10

TABLE II-3
FLOW MEASUREMENT DEVICE FOR EACH SAMPLING LOCATION

Location	Type	Pipe	Size (in.)	Type	Device	Size (in.)
3-B	Cast Iron		12	Pipe		--
8-A	Clay		12	Rectangular Weir		8.5
9-A	Cast Iron		12	Rectangular Weir		8.0
12-C	(Pumped Flow)		--	Sonic Flow Meter		--
Cerro West	Clay		18	Rectangular Flume		18.0

III SUMMARY OF FLOW MONITORING DATA

The flow monitoring data collected for the five sampling locations is displayed by the following items, which are presented in the order listed following this page:

- 1. Calculation Sheets for Establishing Flow Rate Curves**
- 2. Flow Rate Curves**
- 3. Flow Rate Measurement Summary**
- 4. Statistical Summary for All Sampling Locations**

SVERDRUP

JOB CERRO COPPER PCR MONITORING

COMPUTATIONS FOR WEIR CALIBRATION DATA

SHEET NO. 1 OF 1
DATE 8-17-87
BY DWG CHKD EJO

LOCATION 3B

<u>HEIGHT (IN)</u>	<u>QUANTITY (GAL)</u>	<u>DURATION (SEC)</u>	<u>FLOW RATE (GAM)</u>
.75	20	64	18.8
.75	20	72	16.7
.75	20	77	15.6
.75	20	76	<u>15.8</u>
		AVG.	<u>16.7</u>
1.75	35	21	100.0
1.75	35	21	<u>100.0</u>
		AVG.	<u>100.0</u>
1.0	25	41	36.6
1.0	25	42	35.7
1.0	25	42	<u>35.7</u>
		AVG.	<u>36.0</u>
1.5	25	20	75.0
1.5	25	20	<u>75.0</u>
		Avg.	<u>75.0</u>

SVERDRUP

Job CERRO COPPER PCR MONITORING
COMPUTATIONS FOR RATING CURVE
LOCATION 8A

SHEET NO. 1 OF 1
DATE 8/17/87
BY Jr CHKO DLO

RECTANGULAR WEIR WITH 2 END CONTRACTIONS

$$Q = 3.33 (L - 0.1n h) h^{3/2}$$

$$L = \underline{0.708}$$

$$n = 2$$

WHERE Q = DISCHARGE, CFS

L = LENGTH OF CREST, FT

n = NUMBER OF END CONTRACTIONS

h = HEAD OVER CREST, FT

<u>(IN)</u>	<u>h</u> <u>(FT)</u>	<u>Q</u> <u>(CFS)</u>	<u>(GPM)</u>
0.25	0.0208	0.0070	3.2
0.50	0.0417	0.0198	8.9
0.75	0.0625	0.0362	16.2
1.00	0.0833	0.0553	24.8
1.50	0.1250	0.1005	45.1
2.00	0.1667	0.1529	68.6
2.50	0.2083	0.2109	94.7
3.00	0.2500	0.2737	122.7
4.00	0.3333	0.4109	184.4

SVERDRUP

JOB CERRO COPPER PCR MONITORING

COMPUTATIONS FOR WEIR CALIBRATION DATA

SHEET NO. 1 OF 1
DATE 8-17-87
BY DWS CHKO lgo

LOCATION 9A

<u>HEIGHT (IN)</u>	<u>QUANTITY (GAL)</u>	<u>DURATION (SEC)</u>	<u>FLOW RATE (GPM)</u>
1.125	5	8.5	35.3
1.125	5	8.0	<u>37.5</u>
			AUG. <u>36.4</u>
1.5	5	6.3	47.6
1.5	5	6.1	<u>49.2</u>
			AUG. <u>48.4</u>
2.5	5	3.0	100
2.5	5	3.0	<u>100</u>
			AUG. <u>100</u>

SVERDRUP

JOE CERRO COPPER PCR MONITORING

COMPUTATIONS FOR RATING CURVE

SHEET NO. 1 OF 1
DATE 8-14-87
BY DAB CHKD CWD

LOCATION 9A

RECTANGULAR WEIR WITH 2 END CONTRACTIONS

$$Q = 3.33 (L - 0.1nh) h^{3/2}$$

$$L = 0.75' \\ n = 2$$

WHERE:

Q = DISCHARGE, CFS

L = LENGTH OF CREST, FT

n = NUMBER OF END CONTRACTIONS

h = HEAD OVER CREST, FT.

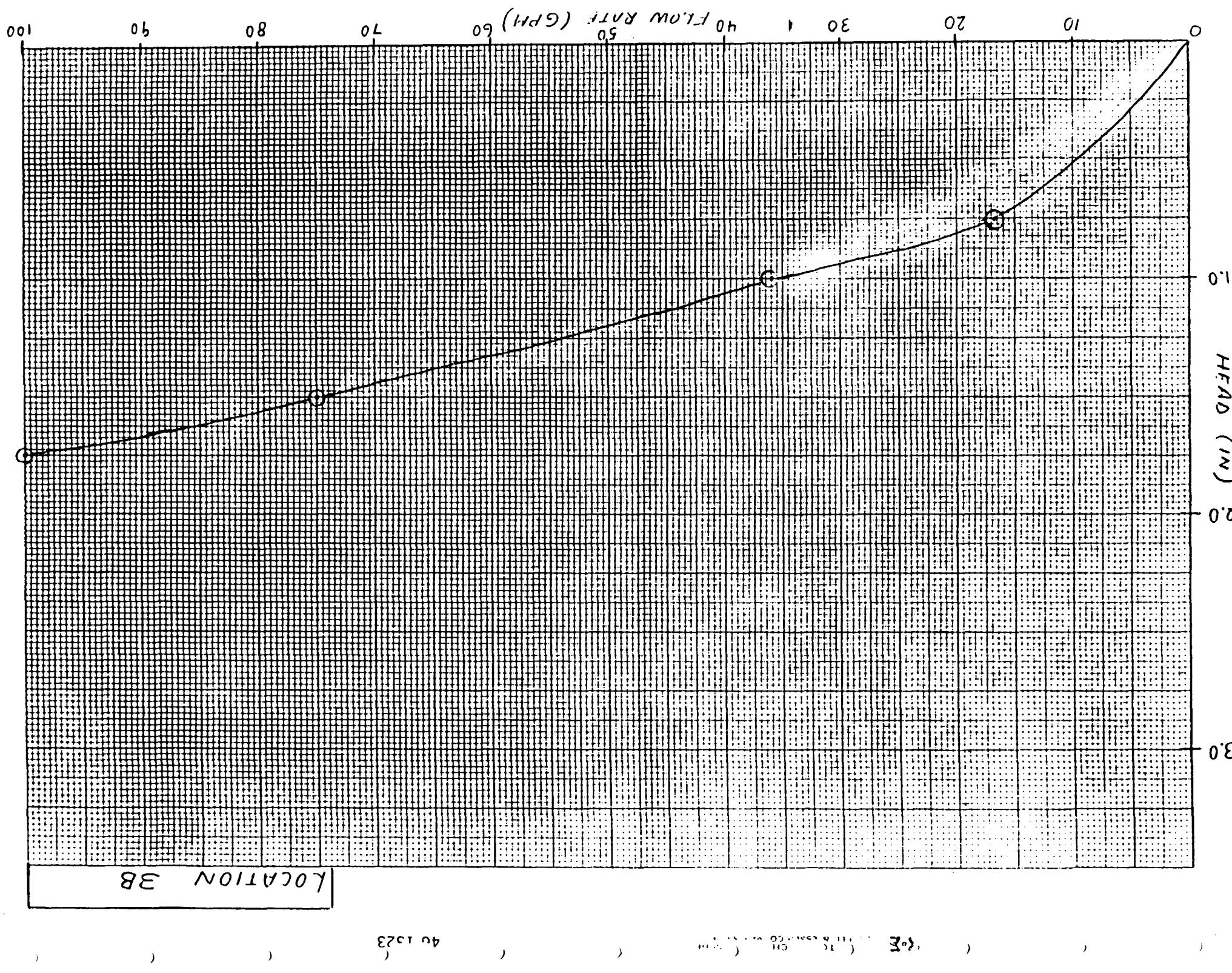
<u>h</u> (in)	<u>Q</u> (CFS)	<u>Q</u> (GPM)
0.25	0.0208	0.0074505 3.3
0.50	0.0417	0.021031 9.4
0.75	0.0625	0.03837 17.2
1.00	0.0833	0.05874 26.4
1.50	0.1250	0.10669 47.9
2.00	0.1667	0.16243 72.9
2.50	0.2083	0.22424 100.6
3.00	0.2500	0.29138 130.8
4.00	0.3333	0.43786 196.5

LOCATION CERRO WEST

LEOPOLD - LAGCO FLUME

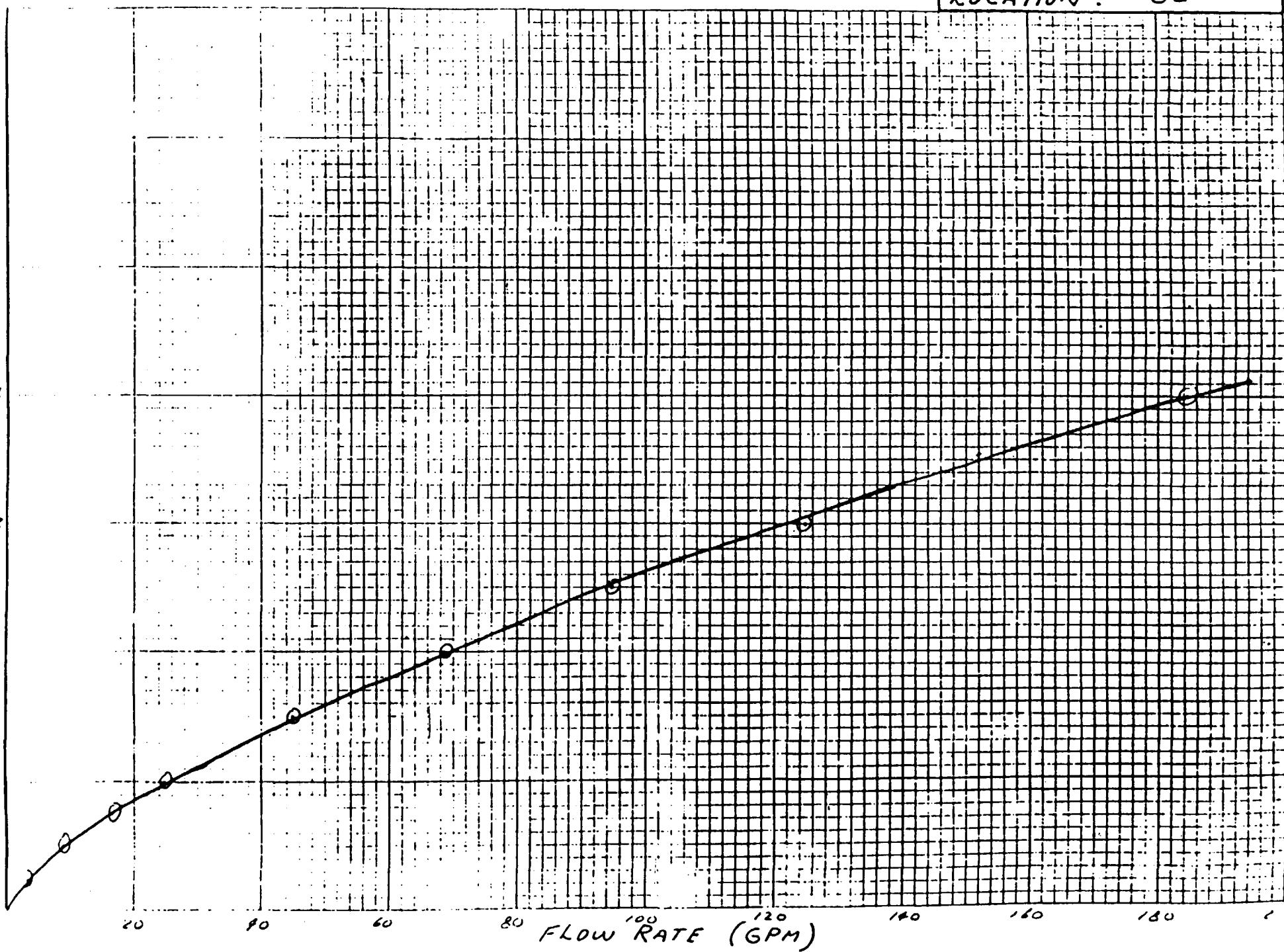
Flume Size - 18"

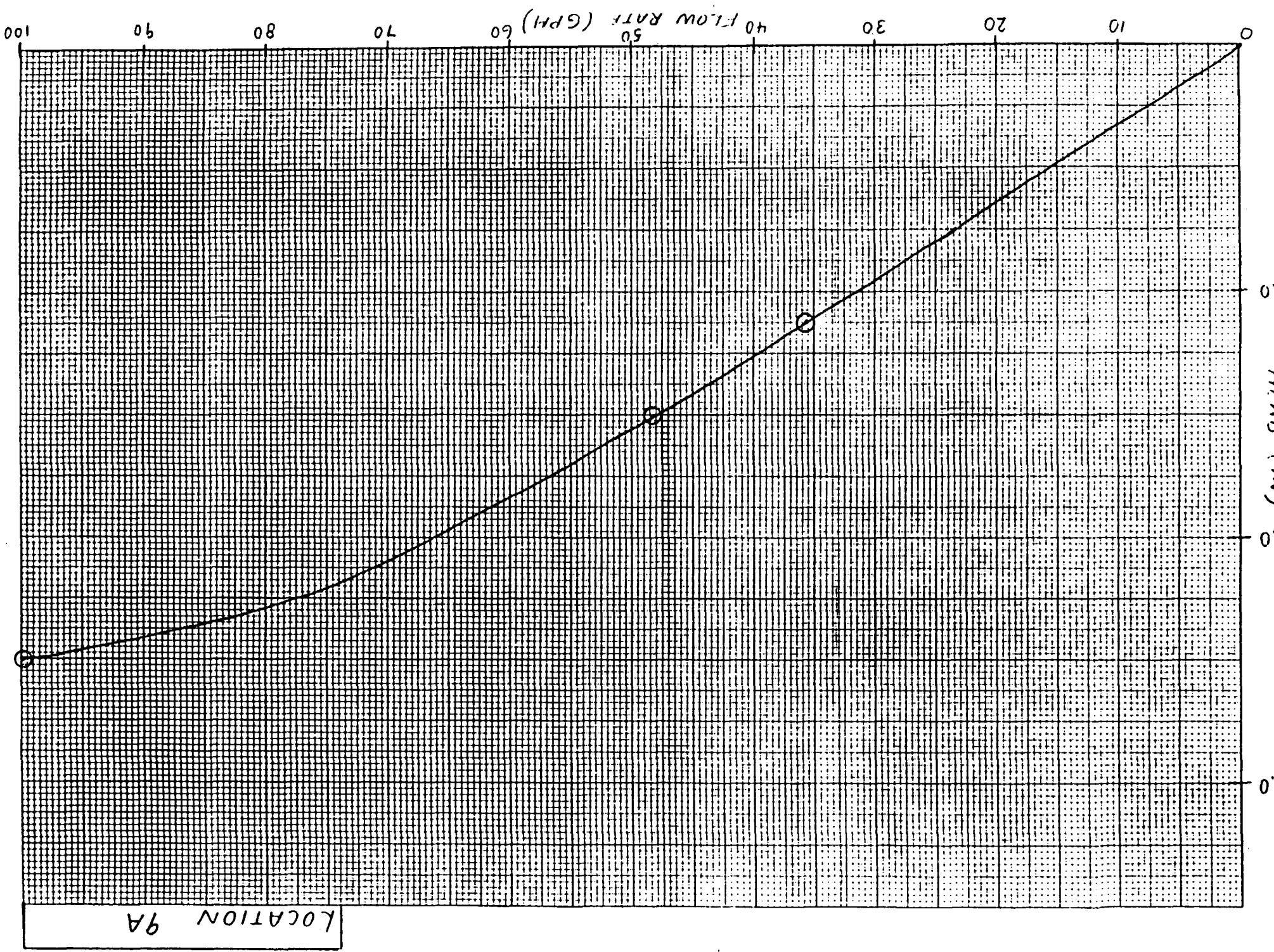
H (Feet)	Q (C.F.S.)	Q (G.P.M.)
.05	.0344	15.44
.10	.1005	45.12
.15	.1882	84.48
.20	.2938	131.84
.25	.4149	186.19
.30	.5500	246.86
.35	.6982	313.34
.40	.8584	385.24
.45	1.0299	462.24
.50	1.2123	544.06
.55	1.4049	630.50
.60	1.6073	721.35
.65	1.8191	816.43
.70	2.0401	915.61
.75	2.2699	1018.74
.80	2.5082	1125.70
.85	2.7549	1236.39
.90	3.0096	1350.69
.95	3.2721	1468.53
1.00	3.5423	1589.80
Max.	1.05	1714.44
	1.10	1842.38
	1.15	1973.53
	1.20	2107.84



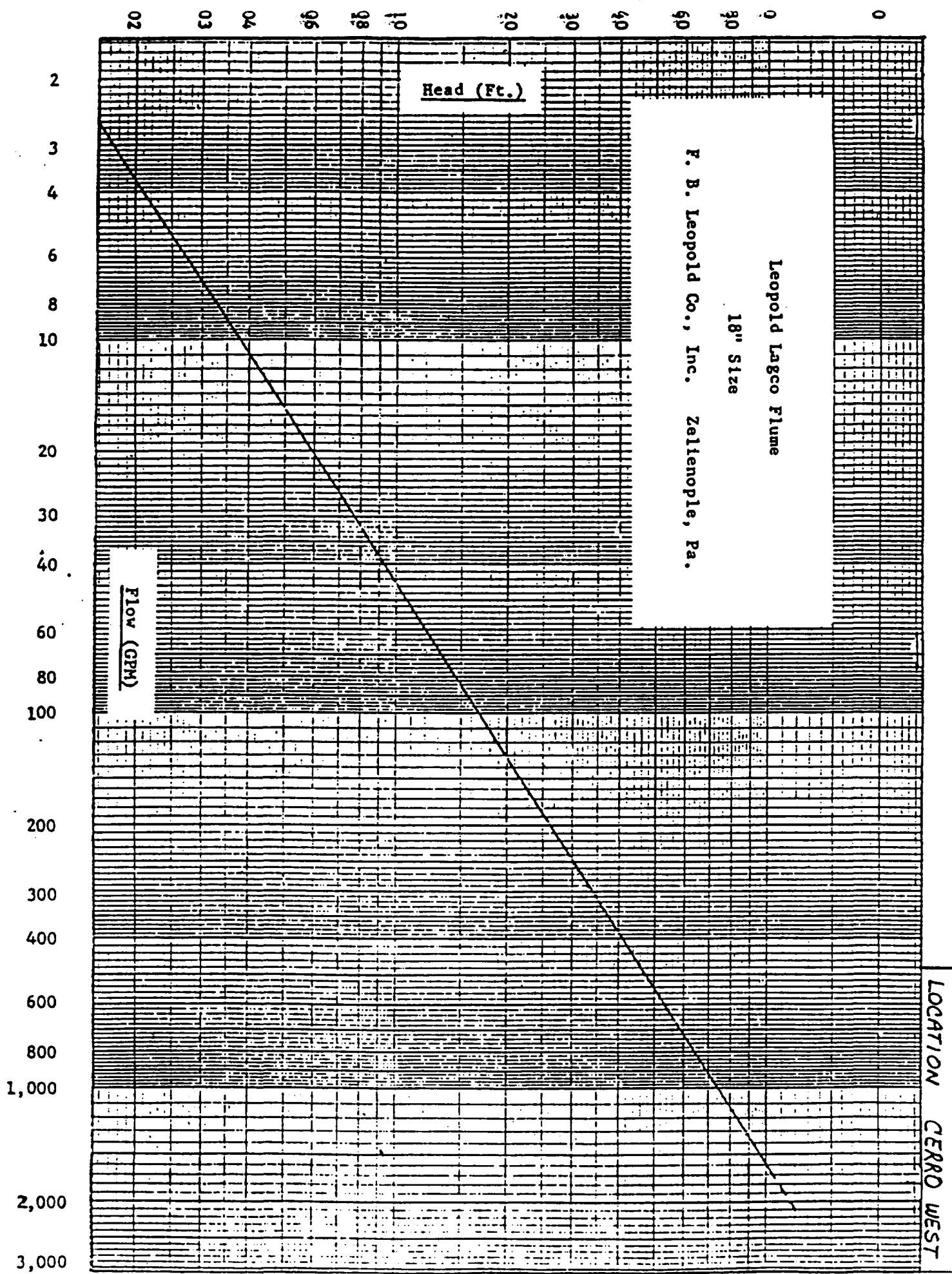
LOCATION: 8c

HEAD (in.)





46 1323



SVERDRUP

JOB

COMPUTATIONS FOR

DATE 12-9-87

CERRO COPPER PRODUCTS

PERIODIC COMPLIANCE REPORT MONITORING

FLOW RATE MEASUREMENTS

LOCATION	TIME	PERIOD				
		1	2	3	4	5
3-B	TIME	0818	1208	1603	2020	0012
	Flow(6pm)	54	54	75	36	54
8-C	TIME	0900	1253	1657	2125	0118
	Flow(6pm)	94	82	94	100	96
9-A	TIME	0825	1215	1610	2035	0025
	Flow(6pm)	20	139	139	15	20
12-C	TIME	0910	1301	1706	2206	0125
	Flow(6pm)	209	237	341	204	185
CERRO WEST	TIME	0833	1223	1625	2048	0047
	Flow(6pm)	80	120	110	135	80
						38

SHEET NO. 1 OF 1

DATE 12-9-87BY Sub CHO - Caw

PCR MONITORING
STATISTICAL SUMMARY OF FLOW RATE MEASUREMENTS

Location	Minimum	Flow Rate (gpm)		Number of Data Points
		Maximum	Average	
3-B	36	75	51.5	6
8-C	82	100	91.7	6
9-A	15	139	67.3	6
12-C	124	341	216.7	6
Cerro West	38	135	93.8	6

310 GPM
450,000 GPD

IV INDEX OF ANALYTICAL DATA

SAMPLING LOCATION 3-B

Date	Time	Metals**	Sample Identification Number*			VOA	NVBN + NVA
			Phenols	Oil & Grease	Water Chemistry#		
12-9	0818	3	3	3	3	--	--
12-9	1208	7	7	7	7	--	--
12-9	1603	13	13	13	13	13	13
12-9	2020	18	18	18	18	--	--
12-10	0012	23	23	23	23	--	--
12-10	0355	28	28	28	28	--	--

* This index correlates sample collection time and Sample Identification Number for the three sample bottles collected during each sampling period. Except for the metals composite samples, the analytical results presented in Section V are keyed to the Sample Identification Numbers. For the metals composite samples, the results are keyed directly to the sampling location.

** The individual metals samples for each sampling period were used to compile a composite sample for this location.

The water chemistry bottle was used for analysis of pH, acidity, and suspended solids.

IV INDEX OF ANALYTICAL DATA

SAMPLING LOCATION 8-C

Date	Time	Metals**	Sample Identification Number*			VOA	NVBN + NVA
			Phenols	Oil & Grease	Water Chemistry#		
12-9	0900	2	2	2	2	--	--
12-9	1253	10/11##	10/11##	10/11##	10/11##	--	--
12-9	1657	16	16	16	16	16	16
12-9	2125	21	21	21	21	--	--
12-10	0118	26	26	26	26	--	--
12-10	0442	31	31	31	31	--	--

* This index correlates sample collection time and Sample Identification Number for the three sample bottles collected during each sampling period. Except for the metals composite samples, the analytical results presented in Section V are keyed to the Sample Identification Numbers. For the metals composite samples, the results are keyed directly to the sampling location.

** The individual metals samples for each sampling period were used to compile a composite sample for this location.

The water chemistry bottle was used for analysis of pH, acidity, and suspended solids.

These are duplicate samples collected to check on laboratory quality control.

IV INDEX OF ANALYTICAL DATA

SAMPLING LOCATION 9-A

Date	Time	Metals**	Sample Identification Number*				VOA	NVBN + NVA
			Phenols	Oil & Grease	Water Chemistry#			
12-9	0825	4	4	4	4	--	--	--
12-9	1215	8	8	8	8	--	--	--
12-9	1610	14	14	14	14	14	14	14
12-9	2035	19	19	19	19	--	--	--
12-10	0025	24	24	24	24	--	--	--
12-10	0405	29	29	29	29	--	--	--

* This index correlates sample collection time and Sample Identification Number for the three sample bottles collected during each sampling period. Except for the metals composite samples, the analytical results presented in Section V are keyed to the Sample Identification Numbers. For the metals composite samples, the results are keyed directly to the sampling location.

** The individual metals samples for each sampling period were used to compile a composite sample for this location.

The water chemistry bottle was used for analysis of pH, acidity, and suspended solids.

IV INDEX OF ANALYTICAL DATA

SAMPLING LOCATION 12-C

Date	Time	Metals**	Sample Identification Number*			VOA	NVBN + NVA
			Phenols	Oil & Grease	Water Chemistry#		
12-9	0910	5	5	5	5	--	--
12-9	1301	12	12	12	12	--	--
12-9	1706	17	17	17	17	17	17
12-9	2206	22	22	22	22	--	--
12-10	0125	27	27	27	27	--	--
12-10	0513	32	32	32	32	--	--

* This index correlates sample collection time and Sample Identification Number for the three sample bottles collected during each sampling period. Except for the metals composite samples, the analytical results presented in Section V are keyed to the Sample Identification Numbers. For the metals composite samples, the results are keyed directly to the sampling location.

** The individual metals samples for each sampling period were used to compile a composite sample for this location.

The water chemistry bottle was used for analysis of pH, acidity, and suspended solids.

IV INDEX OF ANALYTICAL DATA

SAMPLING LOCATION CERRO WEST

Date	Time	Metals**	Sample Identification Number*				VOA	NVBN + NVA
			Phenols	Oil & Grease	Water Chemistry#			
12-9	0833	1	1	1	1	--	--	--
12-9	1223	9	9	9	9	--	--	--
12-9	1625	15	15	15	15	15	15	15
12-9	2048	20	20	20	20	--	--	--
12-10	0047	25	25	25	25	--	--	--
12-10	0430	30	30	30	30	--	--	--

* This index correlates sample collection time and Sample Identification Number for the three sample bottles collected during each sampling period. Except for the metals composite samples, the analytical results presented in Section V are keyed to the Sample Identification Numbers. For the metals composite samples, the results are keyed directly to the sampling location.

** The individual metals samples for each sampling period were used to compile a composite sample for this location.

The water chemistry bottle was used for analysis of pH, acidity, and suspended solids.

metaTRACE, Inc.

13715 Rider Trail North

Earth City, MO 63045

(314) 298-8566

3B

CW

AMPLE I.D.	#6	#13	#14	#15	#16	#17
metaTRACE #	AA06539	AA06540	AA06541	AA06542	AA06543	AA06544
DATE ANALYZED	12/16/87	12/16/87	12/16/87	12/16/87	12/16/87	12/16/87
METHOD	624	624	624	624	624	624
NITS	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L

VOLATILE ORGANIC COMPOUNDS

Benzene	< 5	< 5	< 5	< 5	< 5	< 5
Bromodichloromethane	< 5	< 5	< 5	< 5	< 5	< 5
Bromoform	< 5	< 5	< 5	< 5	< 5	< 5
Bromomethane	< 10	< 10	< 10	< 10	< 10	< 10
Carbon Tetrachloride	< 5	< 5	< 5	< 5	< 5	< 5
Chlorobenzene	< 5	< 5	< 5	< 5	< 5	< 5
Chloroethane	< 10	< 10	< 10	< 10	< 10	< 10
1-Chloroethylvinyl Ether	< 10	< 10	< 10	< 10	< 10	< 10
Chloroform	< 5	33	< 5	< 5	< 5	< 5
Chloromethane	< 10	< 10	< 10	< 10	< 10	< 10
Dichloromethane	< 5	< 5	< 5	< 5	< 5	< 5
1,1-Dichloroethane	< 5	520	< 5	640	< 5	< 5
1,2-Dichloroethane	< 5	190	< 5	< 5	< 5	< 5
1,1-Dichloroethene	< 5	10000	< 5	1100	< 5	< 5
trans-1,2-Dichloroethene	< 5	< 5	< 5	< 5	< 5	< 5
1,2-Dichloropropane	< 5	< 5	< 5	< 5	< 5	< 5
trans-1,3-Dichloropropene	< 5	< 5	< 5	< 5	< 5	< 5
trans-1,3-Dichloropropene	< 5	< 5	< 5	< 5	< 5	< 5
Ethylbenzene	< 5	240	< 5	< 5	< 5	< 5
Methylene Chloride	11	107	< 5	240	13	< 5
1,1,2,2-Tetrachloroethane	< 5	< 5	< 5	< 5	< 5	< 5
Tetrachloroethene	< 5	78	< 5	< 5	< 5	< 5
Styrene	< 5	1400	< 5	80	< 5	< 5
1,1,1-Trichloroethane	130	2000000	< 5	130	18	55
1,1,2-Trichloroethane	< 5	< 5	< 5	77000	< 5	< 5
Trichloroethene	< 5	3200	< 5	< 5	< 5	61
Trichloromonofluoromethane	< 5	< 5	< 5	< 5	< 5	< 5
Vinyl Chloride	< 10	< 10	< 10	< 10	< 10	< 10

B - DENOTES THE ANALYTE WAS FOUND IN THE BLANK AS WELL AS THE SAMPLE

J - DENOTES AN ESTIMATED VALUE

metaTRACE, Inc.

13715 Rider Trail North

Earth City, MO 63045

(314) 298-8566

SITE ID :	#6	#13	#14	#15	#16	#17
MetaTRADE # :	AA06539	AA06540	AA06541	AA06542	AA06543	AA06544
DATE ANALYZED	12/17/87	12/17/87	12/17/87	12/17/87	12/17/87	12/17/87
METHOD	625	625	625	625	625	625
UNITS	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L

SEMI-VOLATILES-625

metaTRACE, Inc.

■ 13715 Rider Trail North

■ Earth City, MO 63045

■ (314) 298-8566

ITE ID :	\$6	\$13	\$14	\$15	\$16	\$17
metaTRACE #: AAD6539	AAD6540	AAD6541	AAD6542	AAD6543	AAD6544	
DATE ANALYZED 12/17/87	12/17/87	12/17/87	12/17/87	12/17/87	12/17/87	12/17/87
ETHOD 625	625	625	625	625	625	625
NITS U6/L	U6/L	U6/L	U6/L	U6/L	U6/L	U6/L

EMI-VOLATILES-625

sophorone	< 10	< 10	< 10	< 10	< 10	< 10
aphthalene	23	< 10	23	< 10	< 10	< 10
isobenzene	< 10	< 10	< 10	< 10	< 10	< 10
-Nitroso-di-n-propylamine	< 10	< 10	< 10	< 10	< 10	< 10
-Nitroso-di-methylamine	< 10	< 10	< 10	< 10	< 10	< 10
-Nitroso-di-phenylamine	< 10	< 10	< 10	< 10	< 10	< 10
benanthrene	< 10	< 10	< 10	< 10	< 10	< 10
xyrene	< 10	< 10	< 10	< 10	< 10	< 10
,2,4-Trichlorobenzene	< 10	< 10	< 10	< 10	< 10	< 10
-Chloro-3-Methyl Phenol	< 25	< 25	< 25	< 25	< 25	< 25
-Chlorophenol	< 10	< 10	< 10	< 10	< 10	< 10
-,4-Dichlorophenol	< 10	< 10	< 10	< 10	< 10	< 10
,4-Dimethylphenol	< 25	< 25	< 25	< 25	< 25	< 25
,4-Dinitrophenol	< 25	< 25	< 25	< 25	< 25	< 25
,6-Dinitro-2-methylphenol	< 25	< 25	< 25	< 25	< 25	< 25
2-Nitrophenol	< 25	< 25	< 25	< 25	< 25	< 25
4-Nitrophenol	< 25	< 25	< 25	< 25	< 25	< 25
5-Nitrophenol	< 25	< 25	< 25	< 25	< 25	< 25
Phenol	< 10	< 10	< 10	< 10	< 10	< 10
2,4,6-Trichlorophenol	< 10	< 10	< 10	< 10	< 10	< 10

3 - DENOTES THE ANALYTE WAS FOUND IN THE BLANK AS WELL AS THE SAMPLE

] - DENOTES AN ESTIMATED VALUE

metaTRACE, Inc.

■ 13715 Rider Trail North

■ Earth City, MO 63045

■ (314) 298-8566

metaTRACE, INC
13715 RIDER TRAIL NORTH
EARTH CITY, MO 63045

PROJECT: 139-01
CLIENT: SVERDRUP CORPORATION
DATE: 01/12/88

SVERDRUP ID:	LAB #	SAMP. DATE	PARAMETER	MATRIX	CONC.	UNITS	DATE ANALYZED
6	AA07098	12/09/87	TOTAL CHROMIUM	WATER	0.370	MG/L	01/08/88
			TOTAL COPPER	WATER	39.2	MG/L	01/08/88
			TOTAL LEAD	WATER	3.67	MG/L	01/08/88
			TOTAL NICKEL	WATER	362.3	MG/L	01/08/88
			TOTAL ZINC	WATER	92.2	MG/L	01/08/88
			TOTAL CADMIUM	WATER	4.55	MG/L	01/08/88
			TOTAL IRON	WATER	14.3	MG/L	01/08/88
10	AA07102	12/09/87	TOTAL CHROMIUM	WATER	0.380	MG/L	01/08/88
			TOTAL COPPER	WATER	49.6	MG/L	01/08/88
			TOTAL LEAD	WATER	19.1	MG/L	01/08/88
			TOTAL NICKEL	WATER	0.690	MG/L	01/08/88
			TOTAL ZINC	WATER	29.6	MG/L	01/08/88
			TOTAL CADMIUM	WATER	0.765	MG/L	01/08/88
			TOTAL IRON	WATER	1.40	MG/L	01/08/88
11	AA07103	12/09/87	TOTAL CHROMIUM	WATER	0.390	MG/L	01/08/88
			TOTAL COPPER	WATER	52.5	MG/L	01/08/88
			TOTAL LEAD	WATER	20.2	MG/L	01/08/88
			TOTAL NICKEL	WATER	0.600	MG/L	01/08/88
			TOTAL ZINC	WATER	30.3	MG/L	01/08/88
			TOTAL CADMIUM	WATER	0.765	MG/L	01/08/88
			TOTAL IRON	WATER	1.40	MG/L	01/08/88
COMPOSITE 3B	AA07093 *	12/09/87	TOTAL CHROMIUM	WATER	1.15	MG/L	01/08/88
			TOTAL COPPER	WATER	0.950	MG/L	01/08/88
			TOTAL LEAD	WATER	0.280	MG/L	01/08/88
			TOTAL NICKEL	WATER	< 0.014	MG/L	01/08/88
			TOTAL ZINC	WATER	0.120	MG/L	01/08/88
			TOTAL CADMIUM	WATER	< 0.005	MG/L	01/08/88
			TOTAL IRON	WATER	0.414	MG/L	01/08/88

* - COMPOSITE 3B CONTAINS A REPRESENTATIVE AMOUNT OF SAMPLE FROM AA07093, AA07099
AA07105, AA07110, AA07115, AND AA07120

metaTRACE, Inc.

■ 13715 Rider Trail North

■ Earth City, MO 63045

■ (314) 298-8566

metaTRACE, INC
13715 RIDER TRAIL NORTH
EARTH CITY, MO 63045

PROJECT: 139-01
CLIENT: SVERDRUP CORPORATION
DATE: 01/12/88

SVERDRUP ID:	LAB #	SAMP. DATE	PARAMETER	MATRIX	CONC.	UNITS	DATE ANALYZED
COMPOSITE 9A	AA07094 *	12/09/87	TOTAL CHROMIUM	WATER	0.049	MG/L	01/08/88
			TOTAL COPPER	WATER	24.1	MG/L	01/08/88
			TOTAL LEAD	WATER	1.34	MG/L	01/08/88
			TOTAL NICKEL	WATER	0.020	MG/L	01/08/88
			TOTAL ZINC	WATER	1.73	MG/L	01/08/88
			TOTAL CADMIUM	WATER	0.077	MG/L	01/08/88
			TOTAL IRON	WATER	0.883	MG/L	01/08/88

* - COMPOSITE 9A CONTAINS A REPRESENTATIVE AMOUNT OF SAMPLE FROM AA07094, AA07100
AA07106, AA07111, AA07116, AND AA07121

COMPOSITE WEST (CERRO)	AA07095	12/09/87	TOTAL CHROMIUM	WATER	0.052	MG/L	01/08/88
			TOTAL COPPER	WATER	17.7	MG/L	01/08/88
			TOTAL LEAD	WATER	1.76	MG/L	01/08/88
			TOTAL NICKEL	WATER	0.057	MG/L	01/08/88
			TOTAL ZINC	WATER	1.44	MG/L	01/08/88
			TOTAL CADMIUM	WATER	0.041	MG/L	01/08/88
			TOTAL IRON	WATER	1.62	MG/L	01/08/88

- COMPOSITE WEST CONTAINS A REPRESENTATIVE AMOUNT OF SAMPLE FROM AA07095, AA07101
AA07107, AA07112, AA07117, AND AA07122

metaTRACE, Inc.

13715 Rider Trail North

Earth City, MO 63045

(314) 298-8566

metaTRACE, INC
13715 RIDER TRAIL NORTH
EARTH CITY, MO 63045

PROJECT: 139-01
CLIENT: SVERDRUP CORPORATION
DATE: 01/12/88

SVERDRUP ID:	LAB #	SAMP.DATE	PARAMETER	MATRIX	CONC.	UNITS	DATE ANALYZED
COMPOSITE 8C	AA07096 *	12/09/87	TOTAL CHROMIUM	WATER	0.298	MG/L	01/08/88
			TOTAL COPPER	WATER	62.3	MG/L	01/08/88
			TOTAL LEAD	WATER	23.1	MG/L	01/08/88
			TOTAL NICKEL	WATER	0.890	MG/L	01/08/88
			TOTAL ZINC	WATER	62.9	MG/L	01/08/88
			TOTAL CADMIUM	WATER	3.32	MG/L	01/08/88
			TOTAL IRON	WATER	84.1	MG/L	01/08/88

* - COMPOSITE 8C CONTAINS A REPRESENTATIVE AMOUNT OF SAMPLE FROM AA07096, AA07102
AA07108, AA07113, AA07118, AND AA07123

COMPOSITE 12C	AA07097 *	12/09/87	TOTAL CHROMIUM	WATER	0.640	MG/L	01/08/88
			TOTAL COPPER	WATER	76.1	MG/L	01/08/88
			TOTAL LEAD	WATER	69.4	MG/L	01/08/88
			TOTAL NICKEL	WATER	6.90	MG/L	01/08/88
			TOTAL ZINC	WATER	43.9	MG/L	01/08/88
			TOTAL CADMIUM	WATER	1.63	MG/L	01/08/88
			TOTAL IRON	WATER	48.4	MG/L	01/08/88

- COMPOSITE 12C CONTAINS A REPRESENTATIVE AMOUNT OF SAMPLE FROM AA07097, AA07104
AA07109, AA07114, AA07119, AND AA07124

metaTRACE, Inc.

■ 13715 Rider Trail North

■ Earth City, MO 63045

■ (314) 298-8566

metaTRACE, INC
13715 RIDER TRAIL NORTH
EARTH CITY, MO 63045

PROJECT: 139-01
CLIENT: SVERDRUP CORPORATION
DATE: 01/12/88

SVERDRUP ID:	LAB #	SAMPLE DATE	PARAMETER	MATRIX	CONC.	UNITS	DATE ANALYZED
1	AA07095	12/09/87	pH	WATER	6.46	pH UNITS	01/14/88
			ACIDITY	WATER	105	MG/L	01/22/88
			TOTAL SUSPENDED SOLIDS	WATER	294	MG/L	01/14/88
			TOTAL PHENOLS	WATER	< 5	MG/L	01/06/88
			OIL AND GREASE	WATER	< 2	MG/L	01/21/88
2	AA07096	12/09/87	pH	WATER	7.98	pH UNITS	01/14/88
			ACIDITY	WATER	36	MG/L	01/22/88
			TOTAL SUSPENDED SOLIDS	WATER	19	MG/L	01/14/88
			TOTAL PHENOLS	WATER	< 5	MG/L	01/06/88
			OIL AND GREASE	WATER	< 2	MG/L	01/21/88
3	AA07093	12/09/87	pH	WATER	8.00	pH UNITS	01/14/88
			ACIDITY	WATER	27	MG/L	01/22/88
			TOTAL SUSPENDED SOLIDS	WATER	56	MG/L	01/14/88
			TOTAL PHENOLS	WATER	< 5	MG/L	01/06/88
			OIL AND GREASE	WATER	3	MG/L	01/21/88
4	AA07094	12/09/87	pH	WATER	7.31	pH UNITS	01/14/88
			ACIDITY	WATER	**	MG/L	01/22/88
			TOTAL SUSPENDED SOLIDS	WATER	27640	MG/L	01/14/88
			TOTAL PHENOLS	WATER	< 50	MG/L	01/06/88
			OIL AND GREASE	WATER	*	MG/L	01/21/88
5	AA07097	12/09/87	pH	WATER	6.06	pH UNITS	01/14/88
			ACIDITY	WATER	114	MG/L	01/22/88
			TOTAL SUSPENDED SOLIDS	WATER	10160	MG/L	01/14/88
			TOTAL PHENOLS	WATER	940	MG/L	01/06/88
			OIL AND GREASE	WATER	599	MG/L	01/21/88

* -NONEXTRACTABLE SAMPLE DUE TO HIGH CONCENTRATION OF OIL & GREASE

** -SAMPLES NUMBERED 7094, 7101, AND 7112 ARE IMMISCIBLE ORGANIC AND WATER MATRICES AND AS SUCH ARE NOT AMENABLE TO THIS PROCEDURE.

metaTRACE, INC
3715 RIDER TRAIL NORTH
EARTH CITY, MO 63045

PROJECT: 139-01
CLIENT: SVERDRUP CORPORATION
DATE: 01/12/88

SVERDRUP ID:	LAB #	SAMPLE DATE	PARAMETER	MATRIX	CONC.	UNITS	DATE ANALYZED
6	AA07098	12/09/87	pH	WATER	1.29	pH UNITS	01/14/88
			ACIDITY	WATER	1700	MG/L	01/22/88
			TOTAL SUSPENDED SOLIDS	WATER	6	MG/L	01/14/88
			TOTAL PHENOLS	WATER	< 5	MG/L	01/06/88
			OIL AND GREASE	WATER	< 2	MG/L	01/21/88
7	AA07099	12/09/87	pH	WATER	7.70	pH UNITS	01/14/88
			ACIDITY	WATER	16	MG/L	01/22/88
			TOTAL SUSPENDED SOLIDS	WATER	6	MG/L	01/14/88
			TOTAL PHENOLS	WATER	< 5	MG/L	01/06/88
			OIL AND GREASE	WATER	< 2	MG/L	01/21/88
8	AA07100	12/09/87	pH	WATER	7.88	pH UNITS	01/14/88
			ACIDITY	WATER	22	MG/L	01/22/88
			TOTAL SUSPENDED SOLIDS	WATER	237	MG/L	01/14/88
			TOTAL PHENOLS	WATER	< 5	MG/L	01/06/88
			OIL AND GREASE	WATER	< 2	MG/L	01/21/88
9	AA07101	12/09/87	pH	WATER	6.81	pH UNITS	01/14/88
			ACIDITY	WATER	**	MG/L	01/22/88
			TOTAL SUSPENDED SOLIDS	WATER	58300	MG/L	01/14/88
			TOTAL PHENOLS	WATER	< 5	MG/L	01/06/88
			OIL AND GREASE	WATER	*	MG/L	01/21/88
10	AA07102	12/09/87	pH	WATER	7.76	pH UNITS	01/14/88
			ACIDITY	WATER	66	MG/L	01/22/88
			TOTAL SUSPENDED SOLIDS	WATER	193	MG/L	01/14/88
			TOTAL PHENOLS	WATER	< 5	MG/L	01/06/88
			OIL AND GREASE	WATER	2	MG/L	01/21/88
11	AA07103	12/09/87	pH	WATER	7.62	pH UNITS	01/14/88
			ACIDITY	WATER	78	MG/L	01/22/88
			TOTAL SUSPENDED SOLIDS	WATER	166	MG/L	01/14/88
			TOTAL PHENOLS	WATER	< 5	MG/L	01/06/88
			OIL AND GREASE	WATER	< 2	MG/L	01/21/88

* -NONEXTRACTABLE SAMPLE DUE TO HIGH CONCENTRATION OF OIL & GREASE

** -SAMPLES NUMBERED 7094, 7101, AND 7112 ARE IMISCIBLE ORGANIC AND WATER MATRICES AND AS SUCH ARE NOT AMENABLE TO THIS PROCEDURE.

metaTRACE, Inc.

■ 13715 Rider Trail North

■ Earth City, MO 63045

■ (314) 298-8566

metaTRACE, INC
13715 RIDER TRAIL NORTH
EARTH CITY, MO 63045

PROJECT: 139-01
CLIENT: SVERDRUP CORPORATION
DATE: 01/12/88

SVERDRUP ID:	LAB #	SAMPLE DATE	PARAMETER	MATRIX	CONC.	UNITS	DATE ANALYZED
12	AA07104	12/09/87	pH	WATER	6.36	pH UNITS	01/14/88
			ACIDITY	WATER	38	MG/L	01/22/88
			TOTAL SUSPENDED SOLIDS	WATER	302	MG/L	01/14/88
			TOTAL PHENOLS	WATER	59	MG/L	01/06/88
			OIL AND GREASE	WATER	107	MG/L	01/21/88
13	AA07105	12/09/87	pH	WATER	7.76	pH UNITS	01/14/88
			ACIDITY	WATER	16	MG/L	01/22/88
			TOTAL SUSPENDED SOLIDS	WATER	22	MG/L	01/14/88
			TOTAL PHENOLS	WATER	10	MG/L	01/06/88
			OIL AND GREASE	WATER	2	MG/L	01/21/88
14	AA07106	12/09/87	pH	WATER	8.15	pH UNITS	01/14/88
			ACIDITY	WATER	11	MG/L	01/22/88
			TOTAL SUSPENDED SOLIDS	WATER	120	MG/L	01/14/88
			TOTAL PHENOLS	WATER	< 5	MG/L	01/06/88
			OIL AND GREASE	WATER	3	MG/L	01/21/88
15	AA07107	12/09/87	pH	WATER	7.07	pH UNITS	01/14/88
			ACIDITY	WATER	44	MG/L	01/22/88
			TOTAL SUSPENDED SOLIDS	WATER	1620	MG/L	01/14/88
			TOTAL PHENOLS	WATER	< 5	MG/L	01/06/88
			OIL AND GREASE	WATER	487	MG/L	01/21/88
16	AA07108	12/09/87	pH	WATER	7.26	pH UNITS	01/14/88
			ACIDITY	WATER	22	MG/L	01/22/88
			TOTAL SUSPENDED SOLIDS	WATER	108	MG/L	01/14/88
			TOTAL PHENOLS	WATER	< 5	MG/L	01/06/88
			OIL AND GREASE	WATER	< 2	MG/L	01/21/88

metaTRACE, INC
13715 RIDER TRAIL NORTH
EARTH CITY, MO 63045

PROJECT: 139-01
CLIENT: SVERDRUP CORPORATION
DATE: 01/12/88

SVERDRUP ID:	LAB #	SAMPLE DATE	PARAMETER	MATRIX	CONC.	UNITS	DATE ANALYZED
17	AA07109	12/09/87	pH	WATER	6.20	pH UNITS	01/14/88
			ACIDITY	WATER	41	MG/L	01/22/88
			TOTAL SUSPENDED SOLIDS	WATER	392	MG/L	01/14/88
			TOTAL PHENOLS	WATER	166	MG/L	01/06/88
			OIL AND GREASE	WATER	653	MG/L	01/21/88
18	AA07110	12/09/87	pH	WATER	7.53	pH UNITS	01/14/88
			ACIDITY	WATER	20	MG/L	01/22/88
			TOTAL SUSPENDED SOLIDS	WATER	1	MG/L	01/14/88
			TOTAL PHENOLS	WATER	< 5	MG/L	01/06/88
			OIL AND GREASE	WATER	< 2	MG/L	01/21/88
19	AA07111	12/10/87	pH	WATER	7.62	pH UNITS	01/14/88
			ACIDITY	WATER	14	MG/L	01/22/88
			TOTAL SUSPENDED SOLIDS	WATER	48	MG/L	01/14/88
			TOTAL PHENOLS	WATER	< 5	MG/L	01/06/88
			OIL AND GREASE	WATER	35	MG/L	01/21/88
20	AA07112	12/10/87	pH	WATER	7.14	pH UNITS	01/14/88
			ACIDITY	WATER	**	MG/L	01/22/88
			TOTAL SUSPENDED SOLIDS	WATER	8820	MG/L	01/14/88
			TOTAL PHENOLS	WATER	25	MG/L	01/06/88
			OIL AND GREASE	WATER	3375	MG/L	01/21/88
21	AA07113	12/10/87	pH	WATER	3.70	pH UNITS	01/14/88
			ACIDITY	WATER	122	MG/L	01/22/88
			TOTAL SUSPENDED SOLIDS	WATER	204	MG/L	01/14/88
			TOTAL PHENOLS	WATER	< 5	MG/L	01/06/88
			OIL AND GREASE	WATER	< 2	MG/L	01/21/88
22	AA07114	12/10/87	pH	WATER	6.29	pH UNITS	01/14/88
			ACIDITY	WATER	38	MG/L	01/22/88
			TOTAL SUSPENDED SOLIDS	WATER	1456	MG/L	01/14/88
			TOTAL PHENOLS	WATER	113	MG/L	01/06/88
			OIL AND GREASE	WATER	362	MG/L	01/21/88

** -SAMPLES NUMBERED 7094, 7101, AND 7112 ARE
IMISCIBLE ORGANIC AND WATER MATRICES AND AS
SUCH ARE NOT AMENABLE TO THIS PROCEDURE.

metaTRACE, INC
13715 RIDER TRAIL NORTH
EARTH CITY, MO 63045

PROJECT: 139-01
CLIENT: SVERDRUP CORPORATION
DATE: 01/12/88

SVERDRUP ID: LAB # SAMPLE DATE PARAMETER MATRIX CONC. UNITS DATE ANALYZED

23 AA07115 12/10/87 pH WATER 7.62 pH UNITS 01/14/88
ACIDITY WATER 20 MG/L 01/22/88
TOTAL SUSPENDED SOLIDS WATER 25 MG/L 01/14/88
TOTAL PHENOLS WATER 72 MG/L 01/06/88
OIL AND GREASE WATER 19 MG/L 01/21/88

24 AA07116 12/10/87 pH WATER 8.06 pH UNITS 01/14/88
ACIDITY WATER 18 MG/L 01/22/88
TOTAL SUSPENDED SOLIDS WATER 30 MG/L 01/14/88
TOTAL PHENOLS WATER 15 MG/L 01/06/88
OIL AND GREASE WATER 9 MG/L 01/21/88

25 AA07117 12/10/87 pH WATER 7.10 pH UNITS 01/14/88
ACIDITY WATER 34 MG/L 01/22/88
TOTAL SUSPENDED SOLIDS WATER 1472 MG/L 01/14/88
TOTAL PHENOLS WATER 57 MG/L 01/06/88
OIL AND GREASE WATER 938 MG/L 01/21/88

26 AA07118 12/10/87 pH WATER 4.06 pH UNITS 01/14/88
ACIDITY WATER 128 MG/L 01/22/88
TOTAL SUSPENDED SOLIDS WATER 210 MG/L 01/14/88
TOTAL PHENOLS WATER 15 MG/L 01/06/88
OIL AND GREASE WATER 12 MG/L 01/21/88

27 AA07119 12/10/87 pH WATER 6.99 pH UNITS 01/14/88
ACIDITY WATER 46 MG/L 01/22/88
TOTAL SUSPENDED SOLIDS WATER 374 MG/L 01/14/88
TOTAL PHENOLS WATER 38 MG/L 01/06/88
OIL AND GREASE WATER 98 MG/L 01/21/88

metaTRACE, Inc.

■ 13715 Rider Trail North

■ Earth City, MO 63045

■ (314) 298-8566

metaTRACE, INC
13715 RIDER TRAIL NORTH
EARTH CITY, MO 63045

PROJECT: 139-01
CLIENT: SVERDRUP CORPORATION
DATE: 01/12/88

SVERDRUP ID:	LAB #	SAMPLE DATE	PARAMETER	MATRIX	CONC.	UNITS	DATE ANALYZED
28	AA07120	12/10/87	pH	WATER	7.74	pH UNITS	01/16/88
			ACIDITY	WATER	18	MG/L	01/22/88
			TOTAL SUSPENDED SOLIDS	WATER	0.00	MG/L	01/16/88
			TOTAL PHENOLS	WATER	< 5	MG/L	01/06/88
			OIL AND GREASE	WATER	< 2	MG/L	01/21/88
29	AA07121	12/10/87	pH	WATER	7.62	pH UNITS	01/16/88
			ACIDITY	WATER	18	MG/L	01/22/88
			TOTAL SUSPENDED SOLIDS	WATER	74	MG/L	01/16/88
			TOTAL PHENOLS	WATER	< 5	MG/L	01/06/88
			OIL AND GREASE	WATER	< 2	MG/L	01/21/88
30	AA07122	12/10/87	pH	WATER	7.38	pH UNITS	01/16/88
			ACIDITY	WATER	36	MG/L	01/22/88
			TOTAL SUSPENDED SOLIDS	WATER	530	MG/L	01/16/88
			TOTAL PHENOLS	WATER	< 5	MG/L	01/06/88
			OIL AND GREASE	WATER	103	MG/L	01/21/88
31	AA07123	12/10/87	pH	WATER	6.93	pH UNITS	01/16/88
			ACIDITY	WATER	26	MG/L	01/22/88
			TOTAL SUSPENDED SOLIDS	WATER	124	MG/L	01/16/88
			TOTAL PHENOLS	WATER	< 5	MG/L	01/06/88
			OIL AND GREASE	WATER	< 2	MG/L	01/21/88
32	AA07124	12/10/87	pH	WATER	6.53	pH UNITS	01/16/88
			ACIDITY	WATER	54	MG/L	01/22/88
			TOTAL SUSPENDED SOLIDS	WATER	258	MG/L	01/16/88
			TOTAL PHENOLS	WATER	66	MG/L	01/06/88
			OIL AND GREASE	WATER	53	MG/L	01/21/88